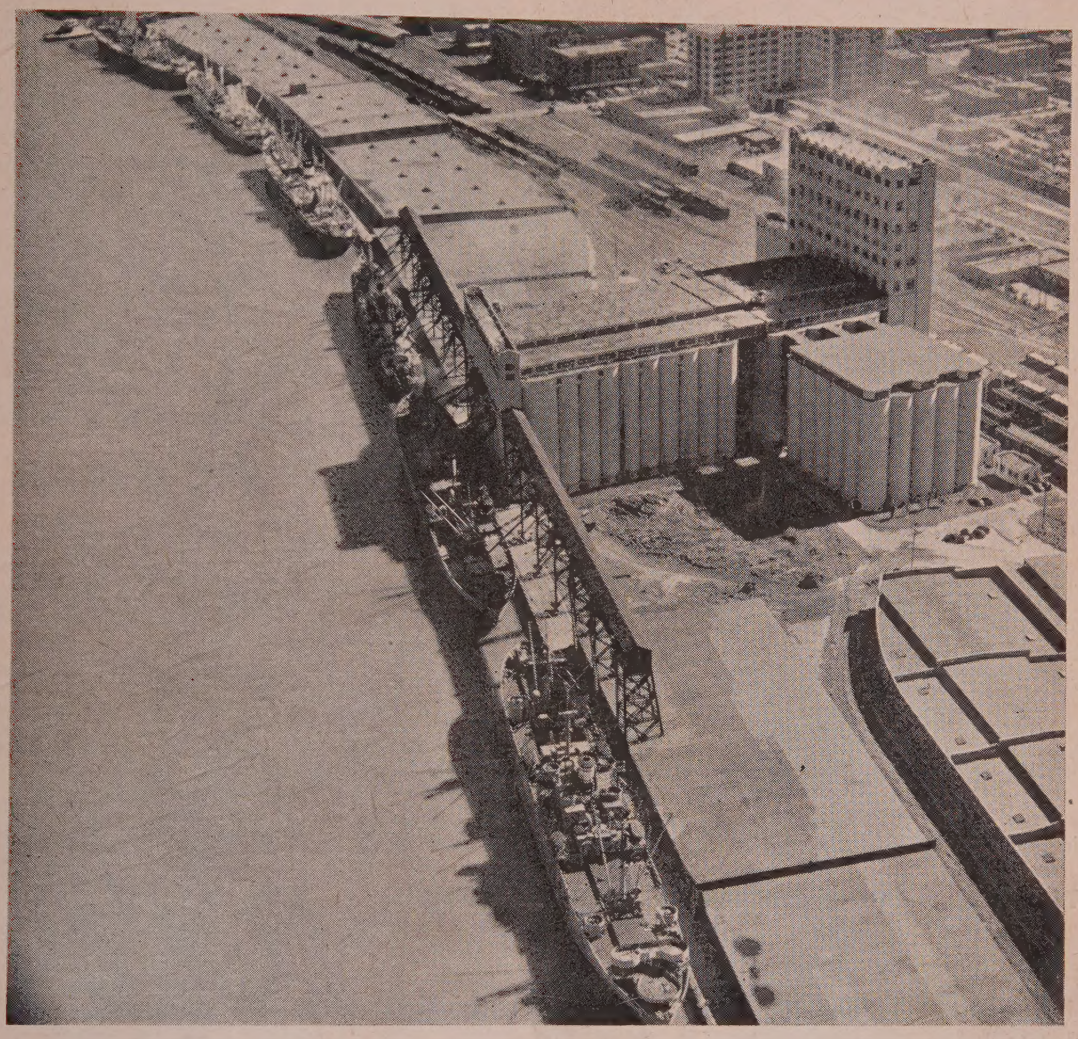


Gulf ports, one of the links in the grain export program, have set new records in the volume of grains handled during the past crop year. Serving as a liaison point from land to sea transit, the gulf elevators sent more than 44 per cent of the 1946 grain crop abroad—and about the same in 1947. Pictured is Elevator "B" at Galveston, Tex.

GRAIN

THE MAGAZINE OF PLANT MANAGEMENT AND OPERATION

AUGUST 1947

Frank Notes—

• Four firsts, three seconds, a third, and a sixth. That's a pretty high record for any food, and represents the remarkable nutritional contribution of grain foods. According to a recent government publication, grain foods rank thus in the total of nutrients they supply: first in iron, thiamine, carbohydrates and calories; second in protein, riboflavin and niacin; third in calcium, and sixth in fat.

• A long strong chain joins the withering crops of Europe to the bill you get from your grocer. It's more fun to blame farmers and middlemen, speculators and free enterprisers than to put the blame where it really belongs—a bloated money-supply, top-heavy purchasing power and a two continent dry spell.

• With his entire week's pay, the average Russian worker can buy 22½ one-pound loaves of white bread; the American, 394 — assuming anybody wants that much. All other items are in line with the difference in the amount of bread each can purchase with their weekly wages—except—in Russia they have the blessings of Communism.

• At a recent meeting of Northwest Shippers Advisory Board several elevator superintendents blamed the railroads for loss of cardays because the elevators were forced to repair cars to make them fit for grain hauling. As one member said: "Some of the cars wouldn't hold a bale of hay."

• Adherents of free enterprise are pointing to the Census Report that 60,055,000 Americans had civilian jobs last June compared with the 60 million Henry Wallace hoped to have working by 1950 under his "full employment" plan.

• "Daylight" paint colors that are designed to lessen eye fatigue in industrial plants and offices, have been developed. The series of colors comprise four off-shades of white formulated to reduce glare from direct and reflected light.

Why We Argue

We argue about "controversial questions" because—

1. We haven't all the pertinent facts and individually may have different sets of facts.

2. We may accept as fact what is not fact at all.

3. We may disagree as to the relative importance of various facts we do have.

4. We may disagree because we have different objectives in mind. Thus, most of us have a "seller's complex" concerning our particular product or service which tends to increase our estimate of its welfare significance and market value.

5. We may at times come to have emotional attitudes of varying intensity toward current problems, which tend further to interfere with careful weighing of pertinent facts.

6. Finally the very words with which we argue may carry different meanings to the listeners than was intended by the speaker.—*By Dr. H. E. Erdman.*

"Grain"

Publication Office
2800 Board of Trade Bldg.
Chicago 4, Illinois
Phones—WABash 3111-3112
WABash 8126-7-8-9; 8102

THE MAGAZINE OF PLANT MANAGEMENT AND OPERATION

DEAN M. CLARK
Publisher and Editor
FRANK J. SLEPICKA
Business Manager—Advertising
A. D. LOGAN
Circulation Manager

REPRESENTATIVES

New York (17) — K. C. PRATT
50 E. 42nd St. — MUrray Hill 2-3737
Chicago (10) — DWIGHT M. BLISH
100 W. Chicago Ave. — SUPerior 8734

SUBSCRIPTION

1 year $2.00 — 3 years $5.00
Overseas $3.00 — Single Copy 25c

SOGES CHAPTER MEETING DATES

1st TUESDAY—Minnesota SOGES Chapter. Smith Champlin, Archer-Daniels-Midland Co., Minneapolis, President; James Auld, Hales & Hunter Co., St. Louis Park, Secretary.

2nd TUESDAY — Omaha-Council Bluffs SOGES Chapter. Charles F. Walker, Archer-Daniels-Midland Co., Council Bluffs, President; John T. Goetzinger, Rosenbaum Brothers, Omaha, Secretary.

2nd FRIDAY — Central States SOGES Chapter. M. M. Darling, Acme-Evans Co., Indianapolis, President; N. R. Adkins, Purina Mills, Lafayette, Ind., Secretary.

3rd TUESDAY — Kansas City SOGES Chapter. Claude Darbe, Simonds-Shields-Theis Grain Co., President; Orrin E. Kinman, Cargill, Inc., Secretary.

3rd TUESDAY — Chicago Soges Chapter. Leonard Danielson, Arcady Farms Milling Co., President; Lincoln Scott, Corn Products Refining Co., Argo, Secretary.

Controllable Factors of Power Costs in the Grain Industry

By H. H. VAN ORNUM
Minneapolis

The author, known to the grain trade through his former connections with General Electric Company and the Hart-Carter Company, is now in the electrical supply business.

The Load Factor in Most Plants Scrapes Bottom. On the Other Hand, Many of Your Motors "Loaf" a Good Deal of the Time, Hence Lower Rated Power Units of the Types Mr. Van Ornum Suggests Will Whittle Down Operating Costs. Friction Losses, "Do's" and "Don'ts" With Belt Conveyors, and "Load Dispatching" Are, Among Many Other Helpful Hints, Clearly Delineated.

THE Superintendent of a terminal grain plant has a real job. His routine duties are many, and vary with the characteristics of the plant he operates, and with the policy of the management. However, the successful Superintendent understands the handling of incoming and outgoing freight transportation by water, rail and truck, and keeps posted on the tariffs connected therewith. He has a thorough knowledge of grain grades and dockage removal. He can expertly select the storage of the many lots of grain he receives so as to avoid mixing grades, and yet give any particular lot special treatment to improve its storageability.

From his knowledge and experience with grain cleaners and graders he is able to guide the management in improving the marketability of the grains and by-products entrusted to his care. His shipments test at the correct grade and weight.

He himself is a good carpenter, mechanic, and millwright. Whether or not his plant is so equipped, he is expected to be a good steam, Diesel, and electrical engineer.

His Is A REAL JOB

HE, as Superintendent, is the instructor of all his men—their leader as well as their executive. He must be a clear, quick thinker, and able to speak and write convincingly, yet diplomatically. He is expected to evaluate the factors which limit the field of operation of his plant, and know what expenditures are justified for plant maintenance, operation or improvement.

The successful Superintendent is a good housekeeper and bookkeeper. He maintains accurate, intelligent cost records of the operation of his plant. He is able to quickly advise the management the cost of handling and conditioning most any quality and quantity of grain as to space, time, labor, and power requirements. His is a real job.

The cost of power used in operating a terminal grain plant is an important factor. It has always been given a great deal of attention, but seems to be difficult to analyze and evaluate for the different operations, such as receiving, cleaning, turning, drying, mixing, and shipping.

Just what is meant by power cost? The power cost in a terminal grain plant is the total cost of supplying the energy used at the driven shaft of the several machines installed in that terminal and used in handling the grain stored or processed by that plant.

Many Factors Enter Calculations

WHAT are the principal factors of this power cost? First, is the interest on the investment of the machinery providing the power and distributing it to the driven shafts of the several machines.

Second, the insurance, such as fire, breakdown, use and occupancy on this power producing machinery.

Third, maintenance, repairs, upkeep, and depreciation.

Fourth, fuels and other supplies converted by the power machinery into energy, or that represented in the case of purchased electric power, by the power bill.

Fifth, the necessary labor to operate and maintain the power producing equipment.

Sixth, the necessary overhead in the form of management and office force to plan and serve that portion of the plant.

We realize that there are no two plants exactly alike as to design of building or source of power and its distribution to the several machines used. The source of power may be purchased electric power, water, power, steam or Diesel power with or without the use of electricity as a means of distribution.

Because many plants purchase electric power and distribute it through a wiring system to electric motors driving the individual machines, it has become possible to analyze the characteristics of the individual machines and learn more definitely their power requirements, and select the type of motor best suited to give lowest power cost.

Analysis of Various Requirements

LET us study for a few minutes the power characteristics of a number of the machines common to most plants with the hope that a better understandnig can be obtained, and perhaps better methods evolved, for the control of the factors of power costs.

The car puller consumes but little energy, but requires momentarily high power shocks. It is customary to use heavy trains of gears to reduce the speed of the motor to the slow line speed of the cable. Interposed in the gear train is some form of friction clutch for applying and removing the power of the motor. The motor is started under no load, and idles until the shock load is applied.

Because this load is momentary, the maximum power of the motor can be used to start the cars. The standard squirrel cage motor has a pull-out torque of between 2½ and 3 times that of full load torque. In other words, a 50 H.P. motor is able to exert between 125 and 150 horsepower momentarily to start a number of

cars. Unless the tracks are badly iced, only a fraction of the normal rating of the motor is necessary to keep the cars moving for the few minutes required to spot them.

By selecting a type of motor which has this high momentary overload capacity, it is possible to use 40 or 50 H.P. motors where formerly 100 or 125 H.P. motors were used on car pullers—thus much reducing the investment cost, and, as we will later discover, lower materially the operating cost.

This Motor Rests Often

THE car shovel machine is another slow speed machine. Its normal location has until recently made it inconvenient and expensive to drive with a motor of normal speed characteristics. This machine also operates under shock loads of short-time duration. Two good shovelers should be able to do the principal shoveling in unloading a car in a very short time. There is then the period of sweeping up, removing the car from the pit, spotting the next car, and removing the grain doors before the next shoveling operation begins.

Because of the resting periods favoring the motor, it can be operated at high overloads during the period of load. A type of motor having high pull-out torque permits the installation of a motor of rather low horsepower rating. By the use of reduction gears of proper design, the power equipment of a car shovel can be obtained at reasonable expense and very low operating cost.

Where these two types of machines are driven from line shafts through rope drives or belts, the design of such drives and shafts must be large enough to stand the maximum shock load imposed. The line shaft, in turn, is driven by some very much larger source of power, and therefore we are never sure of just how much power is delivered through the transmission equipment for pulling cars or shoveling grain—there being the ever-present danger of breaking some of the equipment, causing shutdowns and delays. The electric motor with its maximum overload capacity represents the safety valve against breakage.

Friction Loss of Buckets Can Only Be Estimated

THE bucket elevator is a rather simple machine. We all know that proper designs of boots and heads are important as it has been necessary to change many of them after installation to make them work properly. The design, spacing and speed of the buckets on the leg belt are also important factors of the capacity of the leg. Many and varied recommendations can be had from the many manufacturers of improved types of buckets, but there is considerable confusion in the efficiency of a bucket elevator operating at its rated capacity. In other words, the friction loss is not a known factor and has only been estimated.

Tests have been made on a number of bucket elevators driven by high grade electric motors of the proper type, to determine the friction load in the different parts of a leg, including the dragging of the buckets through the grain in the boot, and it has been found that at 75% of the rated capacity the friction is little more than 5%, but increases rapidly to full load rating where it may be as much as 30 or 50% of the theoretical power required to lift the grain.

A bucket elevator elevates grain by volume, and in direct proportion to the extent that the buckets are filled to capacity. It appears that it is more difficult to fill to capacity a high speed bucket than a slow speed bucket, and therefore a leg equipped with high speed buckets should be rated a little less in proportion than a leg equipped with slow speed buckets. In other words, there is danger of over-rating a high speed leg, and, in attempting to obtain that capacity, considerably more grain must be fed into the boot in order to fill the buckets, greatly increasing the boot friction loss and, hence, power consumption, overloading the motor or power transmission machinery.

Many "Ifs" And "Ands" With Belt Conveyor

IT is difficult to determine accurately the power required to operate a belt conveyor at different loads, tension of belt, temperature of weather, type of bearings, and lubrication. Normally, the belt conveyor carries grain in a horizontal plane and therefore does little work. The load is friction, except for the inclined belts or lifting the grain over trippers.

By a little thought it is easy to see that this friction is divided into many factors. From many tests it appears that the flexible rubber belt has less friction than the stiff rubberized or canvas belts. It appears that properly lubricated anti-friction bearings have about 25% less friction than the ordinary grease cup lubricated sleeve bearings, and that when a belt conveyor is carrying a heavy load of grain, the power requirement is less for a belt under high tension than it is when this same belt is slack. For this same reason a belt driven from the head pulley requires less power than a belt driven from the tail pulley.

This fact has been determined—that under a temperature condition of 30° the power required to start the belt from rest with normal grain load on the belt, is approximately 2½ times the power required to pull the belt at normal speed loaded, and that the total power to pull the belt is in direct proportion to its length under the same load of grain. In other words, a belt carrying 15,000 bushels of grain per hour, 200 feet long, will require twice as much power as the same belt 100 feet long. Experience has taught that the double squirrel cage high starting torque motor will permit using motors of much lower horsepower rating than has normally been considered necessary for conveyor belts. This reduces the first cost, and very materially the operating cost.

Old-Time Dust Systems Extravagant In Power

THERE is one other very important device or system used in a terminal plant which in many cases consumes more energy than all of the rest of the machinery combined—that is the old-type dust collecting system. It appears that the dust collecting system is often an afterthought—something that has been installed in the plant from necessity under threat of suspension of operation, and apparently many older installations have been made with the thought of keeping the initial investment to the lowest possible figure.

Single fans of rather large capacity have been installed with the idea of saving as much space as possible, either in the basement, on the work-floor, cleaner floor, or bin floor, attempting to collect the dust from many remote locations and exhausting the dust-laden air to collectors some distance away. The resistance to the flow of air through such ducts is tremendous. The velocity of the air must be high in order to hold the dust in suspension. Such installations require long runs of air ducts and many sharp bends.

Many machines are connected to such a system whether they are in operation or not. The one system must be ready to serve all portions of the elevator should it be in operation. The power requirement and energy consumed by such antiquated systems are invariably very high and represent a large portion of the total power consumed by the elevator. A number of

small systems divided somewhat by departments or by the use of the elevator machinery have been found to be much more economical in power consumption, quite often less expensive to install, and occupying less valuable space.

Transmission Machinery Chargeable To Power Costs

AT this point we might discuss what really constitutes the machinery chargeable to power. In an elevator equipped with individual motors driving each machine, it is only necessary to provide the drive, including speed reducing equipment between the motor and the driven shaft of the machine, but in an elevator driven, let us say, by steam engine, directly coupled to a main line shaft, a tremendous amount of transmission machinery, shafts, bearings, rope drives, belts, clutches, etc., is required to distribute this power to the individual machines. Many of the machines have to be inconveniently located because it is impossible to drive them mechanically from the main line shaft at the place the Superintendent could most conveniently install that machine.

The amount of spouting, belt conveyors and screw conveyors necessary to serve the machines under such conditions is increased materially over that in a house equipped with individual electric motors, but isn't it just as proper to charge to the steam engine power plant the transmission machinery as it is to charge to that plant the boiler equipment? The individual electric motor installation uses a system of wiring to distribute the electrical energy to that motor installation, and it is proper to charge the cost of the wiring distribution to power cost. Therefore, in computing costs on investment, maintenance, operating expense—the transmission machinery should be charged to the power costs.

Spotty Loads Costly

IN all-electric drive plants, whether or not the electric power is generated at the plant or purchased from a power company, there are two very important factors of cost. One is the load factor, and the other is the power factor.

A large portion of the machines installed in flour mills, malt houses, or linseed oil plants, run under steady load night and day—oftentimes for six months without shutdown, and even then for only a day or so to make emergency repairs. A few years back, many of these types of plants reported almost continuous operation over several years' period. In the linseed oil industry it is common practice to receive, clean, and transfer the grain during the day time and store up the meal cake for grinding during the night. This staggering of fluctuating loads results in an almost constant uniform power demand. Where steam power is used, the boilers can be operated at a constant steam producing rate—ideal for good economy and long life of boiler room equipment. Every piece of equipment, and all of the operators move along like clockwork without the least confusion.

Such a load operated continuously at uniform rate for one year would have a load factor of 100%. The maximum demand times the total hours in a year, equals the total number of horsepower hours or kilowatt hours used by the plant. But, with a fluctuating load like that of a grain elevator, we have high demands for power for an instant—at least for a few minutes—and then the load may drop off to a very low value for a short or long period. In the busy season the boiler room attendants are continuously on the jump, trying to adjust the rate of firing and boiler feed water to prevent wide fluctuating steam pressure.

Load Factor Scrapes Bottom

THE plant may shut down at any time of the day, but always must be ready to get under way at a moment's notice. Normally most grain elevators seldom operate over eight hours per day and are idle almost all Sundays and holidays. The hours of operation are but a fraction of the total number of hours there are in a year. The total horsepower hours or kilowatt hours used by such a plant, compared with the total it would have used if it had operated continuously for one year at the maximum demand, is the ratio called load factor.

In peace times most terminal grain elevators operate at a load factor of less than 15%—many of them close to 10%. Yet the size and rating of the steam plant, Diesel plant generating equipment or transformer bank, must be such that it must be able to carry the maximum demand for an appreciable length of time. Hence, the investment in power producing equipment is large compared with the energy in horsepower hours produced.

If the size and rating of the two plants are the same, the investment should be approximately the same. The fixed charges of interest, insurance, taxes, and many other items of overhead expense, should be the same, but the charge per horsepower hour of energy produced would have to be 8 or 10 times higher for the grain elevator than for the flour mill per unit of energy.

These factors make the cost rate of power for a grain elevator much higher than that for a flour mill. If we could operate an elevator at a low rate of demand, continuously, using smaller and less expensive power producing equipment, the cost per unit of energy consumed would approach that for the flour mill.

Load Dispatching of Work Important

MOST schedules for purchased power with their graduated demand and energy charges are an attempt to spread over the total units of energy used per month the fixed charges of the power company's investment in generating and distribution equipment required to serve the plants operating on both good and poor load factors.

A flour mill and a grain elevator operating on identically the same purchased power contract with the same maximum demand, will find that the cost per unit of energy like the kilowatt hour, will be about ½ as high for the flour mill as for the grain elevator. The Superintendent of a grain elevator should therefore bend every effort in load dispatching his work in order to control the maximum demand for power by the machinery of his elevator.

Power factor is also a very difficult term to understand, but unless we understand it thoroughly it is more difficult to control as a factor of reducing the cost of power.

That's What "Power Factor" Is

EVERY poly-phase induction motor must be magnetized before it can be used to produce mechanical power. When the terminals of these motors are connected to a source of alternating current at rated voltage, a current flows through the winding of the motor, magnetizing the steel in which the winding is embedded, and a rotating magnetic field is produced. If the rotor is free to rotate, it quickly comes up to speed and floats along in synchronism with this field.

Under such conditions the windage and bearing friction losses are so small that they can be neglected. The line current of a motor operating under such conditions is defined as the excitation current. It is 90 degrees out of phase with the voltage and therefore in itself does not produce torque, nor can it be measured by a

watt meter. As load is applied to the motor, a power current is drawn from the line which is in phase with the voltage. It produces torque and can be measured by the watt meter.

The vector sum of the excitation current and power current is the current we read with an ammeter. The line amperes times the voltage gives us the volt ampere input to the motor. The ratio of the kilowatt input, as measured by the watt meter to the volt ampere input, gives us the power factor of the motor. For example, if the power factor of a motor is 80%, it means that the kilowatt input to the motor is 80% of the volt ampere input.

The excitation current of a motor is higher for slow speed motors of the same horsepower and for motors of higher horsepower rating, and is approximately constant from no load to full load for each motor. It is represented by the no-load current into a motor which is seldom less than 25% of the full load current. This excitation current must be supplied by the generator whether or not it is in the private plants or that of the power company miles away. It will be noted that a motor running idle or under light load requires considerable current. The wiring distribution system—transformers, voltage regulators, transmission lines, and generating equipment—must be large enough to supply this current over and above the power current measured by the watt meter.

Synchronous Motors And Capacitors Explained

WE all know that a synchronous motor can be operated at unity power factor or at leading power factor. Such a motor is equipped with a direct current excitor, which supplies locally all of the excitation reated at unity or leading power factor, relieving the main generator and distribution system of this burden. Therefore, if these generators and distribution systems can supply a load of unity power factor, part of their rating is available to serve other customers, or they can be of smaller design, reducing their initial cost and, hence, the investment charges. It is apparent that the plant which can operate at high power factor should receive a bonus, credit, or lower rate charge per unit of energy than the plant which operates at poor power factor.

Capacitors have been developed which can be installed at reasonable cost at load centers where induction motors are used and correct the power factor of the main line by furnishing locally the excitation current for the motors. In many cases such an installation will pay handsome returns in the form of reduced power bills, or permitting the plant generators to carry additional load in motors.

Therefore, there are many factors of power costs in the grain industry which can be controlled to a great extent by the operating Superintendents. The question of whether or not the terminal grain elevator should have its own power plant depends to a great extent on whether or not the Superintendent has the ability and the time to divide his attentions with the problems of receiving, storing, conditioning, and shipping grain with that of operating a power plant. Grain men in general are usually not well informed on power problems, and each management should make the decision as to whether or not they wish to operate two lines of business, each so entirely different.

Can Effect Savings Through Planning

TAKEN as a whole, the grain elevator Superintendent can effect economies and reduce power costs by controlling as much as possible the factors which produce those costs. Over-size motors increase investment and operate at low power factor. Motors equipped with magnetic control are easily started when needed and stopped immediately after they have performed their work, thus reducing the kilowatt hours of energy consumed and greatly reducing the excitation current, which affect the power factor should the motor be left operating at light or no load for long periods of time. Motors of the correct type and rating for each particular machine with automatic control, electrically interlocked where machines operate in sequence, materially reduce the initial investment in motor equipment, distribution equipment, generating equipment, and power costs.

The control of maximum demand by load dispatching of the work being done in a plant at any one time, will have a tremendous bearing on the reduction of power costs. If Superintendents properly understood the effect of high demand for power, many orders from the head office to unload, condition, and ship at high capacity, would probably be cancelled when the Superintendent explained to the management the increased cost of power that the carrying out of such orders would entail.

Who can deny—better twice measured than once wrong.

That which is bitter to endure may be sweet to remember.

Tramp Iron Removal Studies

By T. L. Musser, Superintendent
Western Stevedoring Co., Erie, Pa.

THE problem of removing tramp iron from bulk materials is one that faces every industry, but is especially vital to companies handling and processing grain. Both management and insurance carriers are placing an ever-increasing amount of emphasis on eliminating tramp iron, since insurance statistics list iron contamination in grains as one of the leading causes of dust explosions.

Reason for the increasing number of dust explosions—which annually run into millions of dollars of property damage and loss of life—may be caused by the fact that in the past several years we have succeeded in moving large quantities of grains at a faster rate of speed. That means that the tramp iron in that grain is traveling at a faster rate of speed, and as that iron strikes the side of a steel chute or the side of a concrete bin then there is more likelihood of tramp iron spark than when grains were handled at much slower speeds.

Most of us can remember as kids when we would throw a piece of steel on the sidewalk that the chances are it would spark. It appears that there is much more likelihood of a spark caused by the sharp impact of steel on concrete as there is from an impact of steel on steel—but, of course, both possibilities present a hazard that should be eliminated.

Need of Tramp Iron Removal

WE CAN'T help but think that in the past neither management nor insurance companies have emphasized the need of tramp iron removal, because about half of us are merely transferring and storing the grain. [The other half are processing it.]

There are two additional reasons why tramp iron should be removed by elevators which provide their own mills with grain, namely, protection of processing machinery such as grinders, pulverizers, cutters and mills of various kinds; secondly—to assure a finished product free of metal contamination.

So, you see that tramp iron has to be removed somewhere along the line, and it might better be as close to the point of entry to our property as possible. How happy all of us would be if we knew that every freight car, ship or truck bringing grain to our elevators would bring that grain free of metal contamination. But looking at the problem realistically it is inevitable that tramp iron will always be with us, and while most of us have escaped disaster during the past twenty years, it behooves us to do some serious thinking and, if possible, to take action; for with faster moving belts the likelihood of dust explosions is steadily increasing.

The next question is, "What is the best answer to this tramp iron removal problem? Or is there a piece of equipment on the market that will take care of this job?"

No "Cure All" Device

THERE is no 100% "cure all" separating device at the present time that will handle large tonnages of grain on fast moving belts—nor do we believe there will be any, due to the fact that while one elevator may be handling 11,000 bushels of grain per hour on 36 inch belts traveling at 600 feet per minute, its next door neighbor may be moving 20,000 bushels of grain per hour on a 48 inch belt traveling at 1,050 feet per minute. Obviously, it is a much more difficult problem to remove tramp iron from the heavier flow of grain.

Many of you have tried the electro magnetic pulley at the end of your belt conveyor. Electro magnet manufacturers do not recommend that these pulleys travel at a speed greater than 40 revolutions per minute—which means a maximum belt speed of 250 feet per minute on a 24 inch diameter pulley. Consequently, magnetic pulleys operating in belt speeds ranging from 500 to 1,000 feet per minute obviously are not the answer. The electro lifting magnet is also being tried on slower belt speeds. Excellent results are obtained as far as extraction of tramp iron is concerned; however, many elevators are reluctant to install this type of magnet. Their objections are based on the high cost of the unit, the difficulty of installation, the need for rectifiers and wiring, and the need for constant inspection of the rectifier and wiring. One insurance inspector's comment was, "You're just adding another fire hazard to your operations."

The development of the Alnico permanent non-electric magnet, which is being more and more widely used in milling operations, is beginning to offer a favorable solution to the problem of removing tramp iron from heavy volume of materials in the grain elevators. General Electric company, under whose patent Alnico alloy is produced, reports that unless Alnico alloy is subject to severe conditions, such as excessive heat, terriffic shock or accidental contact with other magnetic fields, the strength of an Alnico magnetic separator will last indefinitely.

Alnico Magnets

WE HAVE come to accept the reliability and permanence of Alnico magnets whether we realize it or not. We pay our electric light bills as a result of the readings of a meter. Those readings depend on the ability of an Alnico magnet to obtain its magnetism. Those of us who travel by plane rely on hundreds of Alnico magnets in instruments and motors. A negligible amount of accidents on the railroad are caused by faulty signalling equipment, yet the very reliability of practically all railroad signals depends on the permanence of the Alnico magnet, which is an integral part of that equipment.

One of the reasons progress has been slow in grain elevators incorporating adequate tramp iron protection is due to the fact that there is no central organization that has aggressively tackled this problem. Under the leadership of Secretary Dean Clark, our own publication, "GRAIN" is doing everything in its power to awaken us to this serious explosion hazard.

While National Fire codes for the prevention of dust explosions states that "electro or approved permanent magnets shall be provided ahead of all shellers, crackers, crushers and grinding machinery", to my knowledge no standards have been set up to guide us in selecting equipment. Furthermore, if our elevators do not incorporate processing equipment, there is no one but our own management and insurance carrier to encourage us to install such equipment.

Need For Insurance Inspections

MANY of our organizations have had to "shop" for insurance companies to carry our risk. There is a real need for an insurance inspection organization in the grain industry, not now covered by the Underwriters Grain Association, similar to Associated Factory Mutual Fire Insurance Companies or Factory Insurance Association in the textile industry, to prod us into safety practices and to lead the way in setting up magnetic standards to lick this tramp iron problem.

At the Pennsylvania Grain Elevator in Erie, we have been working in conjunction with Erie Manufacturing Company, an organization that has

been studying this problem for several years. This company, which builds only Alnico non-electric magnetic separating equipment, came on the scene in 1942, and has accomplished a lot in making difficult tramp iron removal jobs easy with properly installed permanent magnets. One premise on which they work is that "the installation's the thing."

As a result of their experience, they have found that their most powerful magnet will not do a good tramp iron removal job when it is improperly installed. Very often the difference between five or ten degrees in the angle or repose, or the incorporation of a baffle to retard the flow of material, will transform a faulty installation into a most effective one.

It has been almost a year since we started our work with Erie Mfg. Company, and after experimenting with the suspended magnet, which was ineffective because of the fast speed of belts, we determined, after going over our entire system, that the best point of installation was in the elevator boot itself. Our grain travels on a 48 inch side belt at a speed of 1,050 feet per minute. In the trough of the belt the grain varies in depth between five and seven inches. As you know, when grain, traveling at this rate of speed comes to the head pulley, it flies right off into space. Here we have installed a rubber baffle which slows down the velocity and causes it to drop across an Erie magnetic plate 58 inches wide and 21 inches long. This plate contains three rows of Jumbo magnets and all three rows contain steps behind which smaller pieces of tramp iron are supposed to hide so that they will not be brushed off the magnet plate by the velocity of grain passing over it.

First Tests Disappointing

ON OUR first series of tests, which consisted of throwing anywhere from 12 to 18 pieces of tramp iron into the grain prior to the magnet installation, results averaged 55% removal, which was most disappointing. By changing the angle of repose from 75 degrees to 60 degrees, results were somewhat better. Our main trouble, we now feel, is due to the fact that the rectangular outlet carrying the grain away is restrictive, and as a result there is a backup partially covering the magnet.

Since the opening in our concrete floor leads to spouting which is the same size as the opening, we have been reluctant to make this change to give the magnet a "fair chance". In increasing the effectiveness of our installation, two small side magnets now flank the major magnet, and on this temporary set up our latest test results revealed 80% efficiency.

We are confident that with adequate side magnets our removal percentage will reach the 90% bracket, and we only wish that we had sufficient room in our boot to permit a zig-zag shoot arrangement which we feel would give us better than 95% results.

One surprising discovery was made in examining the position of tramp iron on the stepped plate Eriez permanent magnet. Instead of finding nails and circular pieces of tramp iron behind these protective steps, there is an accumulation of fine iron particles, whereas sizeable pieces of tramp iron adhere to the flat section of the plate and cannot be brushed off even with a stiff broom. Our findings have revealed the step in the face of a magnet does not add to its effectiveness; rather, it makes cleaning more difficult. A flat faced magnet will be specified on future requirements.

Those of us who are using magnetic separators are certain, of one thing—grain passing through our elevators is heavily contaminated with tramp iron. Naturally some freight cars and boats are worse than others, but the cleanest is bad enough.

How to Clean Magnet

I KNOW one of the first things that comes to mind is, "How often must I clean a permanent magnet?", and, "What's the best way to clean it?" After observing the amount of tramp iron removed from our grain, the ERIEZ personnel recommend that the tramp iron be removed every eight hours.

Although a permanent magnet becomes completely loaded with tramp iron, it magnetizes the nails, links of chains, etc. that it removes, consequently, other pieces of tramp iron sliding across these nails or links of chain also are removed,—but that process doesn't go on indefinitely, because at some point the magnet reaches saturation. We have let the magnet go as long as twenty-four hours without cleaning to come back and find the unit more heavily loaded than before.

Undoubtedly, the oftener the magnet is cleaned the better chance it has to do an efficient tramp iron removal job. One good idea that has been tried on encouraging help to clean a magnet is to allow whoever cleans the magnet to keep whatever is on it. Tools, pocket knives and other articles of value have been found and all of this adds a little interest to the cleaning job.

As for cleaning it, this is accomplished by sliding the material to the edge of the magnet and pulling it off into a container. Since periodic inspection should be given any type of magnet installation, we do not consider this an excessive chore.

While at the present time, cleaning entails a man entering the boot to remove tramp iron, one or two things can be done to make this job easier:

1. Hinge one complete side of the boot so that it can swing open to make the magnet more accessible.

2. Install the magnet on rollers which would extend over the floor itself—which would facilitate the job of removing the tramp iron from the magnet. If all of us went to work on this problem promptly, someone might be ingenious enough to install scraping device that would slide the tramp iron from the face of the magnet as the magnet is removed from the elevator boot.

Another fair question is, "Is there any self-cleaning permanent or electro magnet arrangement that can be worked out?"

While we do not profess to know all the answers, to our knowledge the development of such a unit is quite far away and the cost of such a piece of equipment would likely be prohibitive.

Summary

IN SUMMARY, a great deal of progress has been made in removing tramp iron from bulk flows of grain in terminal elevators. Permanent magnetic separators—at least those produced by ERIEZ Manufacturing Company—can be made any size and shape and we are confident that if cost is not a limiting factor, that 90% to 100% effective tramp iron removal can be accomplished.

Since there is a vast diversification in the size of elevator boots and the volume of grain carried on individual lines, it means that equipment will have to be built up to fit various lines. As we see it, there are two steps to take:

1. Determine from management the maximum amount they are willing to invest in each line to remove tramp iron.

2. Provide the manufacturer with the complete dimensions of your elevator boot including width and speed of conveyor belt, maximum volume of grain processed per hour, distance between top of the belt and your discharge opening and the size of that opening.

The National Fire Protection Association's records reveal a long list of elevator grain dust explosions. Hundreds have been killed and many more injured. Property damage from dust explosions is appalling. Causes of these explosions range from a hot bearing to failure of electrical equipment. Many explosions have definitely been known to have been caused by tramp iron. The great majority of causes are not known because the force of the explosion usually is fatal to anyone near the source of the blast.

From a selfish standpoint alone, it behooves all of us to work with management and our insurance carriers —in fact, to "carry the ball" in an effort to remove tramp iron from materials that enter our property in order that grain elevators will be a safer place in which to work.

Maybe You Don't Care, But

DUST EXPLOSIONS ARE "TAME" IN COMPARISON

Business men of the nation are supinely permitting the story of a democratic enterprise to be told "in a distorted fashion by radicals and demagogues without any effort to counter this technique by an effective presentation of the values of our business system," Ody H. Lamborn, President of Lamborn & Company, New York brokers, said in a recent address. He added that business men and their key executives should start "educating their employees and their stockholders so that they will have a real perspective and understanding of what is developing in this country."

Through educational work and public relations, the business man should "take over his proper share of telling the public the facts about the democratic business system, the values of our freedoms" and "the many other factors so important if we are to maintain a free democracy. After all, the business man can perform his work under the present democratic system only so long as that system is permitted to continue. If he thinks it is a good system, then he should go out and sell the system as effectively as the product he makes or the service he renders.

"Surely more important than earnings and dividends must be the perpetuation of our free society, which permits the investor and the worker to own money and invest it. It should be very simple to convince an employee or a stockholder that in the switchover to a communistic or related system he would be a two time loser, first as a free entity and second as a possessor of capital."

Mr. Lamborn said that if we would "give up the radio or the comic strips for just one hour and read the Constitution of the Union of Soviet Socialist Republics, we would be amazed, shocked and enlightened. Individually and collectively we must become vigilant, for the enemies of freedom are on the march here as well as in the other nations of the western hemisphere," he warned.

"If most workers really understood the facts, they would rather be ditch diggers in a capitalistic society, possessing the freedoms that go with it, than to be the highest 'Deputy' of a communistic or fascist state, for life under such a system is completely regimented and is subject to 'liquidation' without notice.

"But how much do you think the democratic masses know about the insidious forces at work in the western hemisphere which are planting seeds of discord, insinuating themselves into important departments of our Government and labor unions, inspiring sugar coated programs with an inside kernel of bitter gall and basic anti-freedom?

But Communists Preach Opposite

"Labor, capital and management need to become more and more conscious that nothing of lasting good is possible without cooperation; that class war breeds hatred and destruction; that each of the three groups is necessary to maintain and improve the standard of living for the public at large; that the gift of freedom brings with it the responsibility of freedom; and that the type of freedom that we have is not possible except under our system of cooperative effort where men are free to do creative thinking, free to move and act, and, through coöperation, express in concrete and constructive form the results of their creativeness for the benefit of all. Quite naturally the closest coöperation and sympathetic understanding is required on all sides if the team is to coördinate properly, be effective, and make good progress down the road of better living.

"I don't know what your experience has been, but mine is that the average American businessman devotes a great deal of time to complaining about many of the unsavory and dangerous conditions I have touched upon. However, so far as I can see, precious little has been and is being done by them to counteract them.

"It is self-evident that, much as we have progressed in North America in technical research, mass production, efficiency, and other arts, we have a stupendous job before us in the field of human relations. It would seem that, whereas we have graduated from college from the standpoint of the mechanical arts, we are still in kindergarten in the matter of human relations."

Your active coöperation and mine in teaching the fundamental economics of our democracy is mandatory. Start on a well organized educational program N-O-W! Those who would undermine your security and livelihood are scheming, conniving, and working night and day to take what you have away from you. If it's worth fighting for then get busy today! YOU.

Air Your Views at Meetings, Ask for Questions. Read the Soviet Constitution to Your Crew

CORN PRODUCTS' PRESIDENT TELLS VIEWS

No form of business enterprise, private or cooperative, should be given advantages over its competitors by government, declared Morris Sayre, president of the Corn Products Refining Company and a director of the National Association of Manufacturers, speaking recently in Elkhart, Ind., before the annual session of the Indiana State Grange.

Making public a statement of position of NAM on cooperatives in relation to other forms of private enterprise, Mr. Sayre said that the manufacturers believed there is "no justification for taxing at the source patronage refunds paid to customers of cooperatives. Amount available for, but not distributed to, patrons as patronage dividends, however, should be taxed as earnings.

"Farm cooperatives are a recognized form of business entitled to compete in a free enterprise system," he emphasized.

Corporation Stockholders' Double-Taxation Inequitable

"In addition to continuing the exemption from taxation of patronage dividends, the Association also believes that double taxation of earnings as applied to dividends to stockholders of all types of corporations, including cooperatives, should be eliminated, and that manufacturing and agricultural interests should join in a vigorous effort to bring this about.

"Nor should capital raising activities of the cooperatives be exempt from the same filing and other SEC requirements as competing forms of business enterprise," Mr. Sayre concluded.

LOOK BE

When Yo

Low cost jo

High prices

What you g
workmanshi

The best gu
how" and *k*

Many score
B. J. Many
preservatio
cerity of pu

If
du
pr
tim
od

You *know* how the Roc
ravages of time and wea
same thing. Through e
through wind, hail, rai
its protective properties
safeguards structural str

Specification "A" costs m
and that's what counts.
manship represent false e

BEFORE

AFTER

B. J. MANY CO., Inc.

30 No. La Salle S
Chicago 2, Ill.

YOND THE PRICE TAG

Buy Repairing and Weatherproofing

are not always an economical buy.

ne do not assure a *thoroughly* good job.

or your money depends upon the quality of material and hat go *into* the job . . . not what you pay *out*.

ntee of top value for your investment is the proved "*know n* integrity of the concern that *does* the job.

elevator structures repaired and weatherproofed by the pany, Inc., long years ago and in as good-as-new state of day, provide tangible evidence of "know how"" and sin- e essential to a *thoroughly* good job.

ECIFICATION "A"

ant the *most* complete, *most* job of repairing and weather- (and want to be sure of *get-* Specification "A" is by all ir best buy.

Gibraltar has warded off the Specification "A" does the temperature changes . . . . Specification "A" *retains* ays watertight . . . securely against deterioration.

t's worth more; lasts longer materials and faulty work- ny.

SPECIFICATION "B"

If you want to dress up the appearance of your structures and cut repairing and weatherproofing costs to the bone, Specification "B" is the job for *you*.

It's a thorough, low-priced job that will save you money now and save you plenty of money later on because it is expertly done, the B. J. Many way, and doesn't have to be done over.

Compared with Specication "A" the protective qualities of Specification "B" are like a coat of armour.

Specification "B" provides immediate protection and *you* can bank on it to keep your structures safeguarded against the elements for a far longer term of time than ordinary cheap jobs priced to sell rather than to protect.

A SURVEY OF YOUR REQUIREMENTS WILL BE MADE AND COST ESTIMATE SUBMITTED UPON REQUEST. NO OBLIGATION ON YOUR PART.

827 N. W. 31st Street, Oklahoma City, Oklahoma
1101 Francis Palms Building, Detroit 26, Michigan
217 Baltimore Life Building, Baltimore, Maryland
3723 Grand Central Terminal, New York 17, New York
Mr. H. W. Webb-Peploe, 500 Rona Street, Interlaken, New Jersey

AUTHORIZED AGENTS: Pioneer Sand and Gravel Company, Inc., 901 Fairview Avenue, North, Seattle 11, Washington ● Northland Machinery Supply Co., Ltd., 203 Hardisty Street, Fort William, Ontario ● Northland Machinery Supply Co., Ltd., Winnipeg,

GOOD HOUSE KEEPING WOULD PREVENT 9 OUT OF 10 FIRES; CARELESSNESS, NEGLIGENCE, AND INDIFFERENCE RESPONSIBLE

During 1946 national fire waste totaled $561,487,000, the highest losses in 20 years, and the second highest ever recorded. This destruction came within half a million dollars of exceeding the record year of 1926, when the waste totaled $561,980,751.

Last year, the waste by fire was greater than in any of the years of vast city-wide conflagrations, such as 1871, when Chicago burned, or 1906 when fire destroyed virtually all of San Francisco. In 1906, by comparison, losses for the whole nation, including San Francisco, were estimated at $518,611,800.

Irreplaceable Resources Lost

The great destruction in 1926 climaxed seven postwar years in which fire losses increased year by year. The nation now has nearly equalled the 1926 waste in just one year after another great war. If the losses continue this upward trend, the nation will be faced with the annual destruction of a billion dollars worth of valuable resources, nearly all of them irreplaceable, by the year 1953.

We are now burning up at the fastest rate in our history. December's fire losses of $58,094,000 were the highest recorded in a single month since the National Board of Fire Underwriters began tabulating monthly losses in 1929. This is an increase of 30% over November, 1946, and 17.4% over December, 1945.

These estimates of fire losses are compiled by the National Board of Fire Underwriters on the basis of losses incurred on fire insurance policies of the Board's more than 200 member companies. Yet these estimates indicate only a portion of the real destruction wrought by fire.

They do not include the jobs lost when factories, stores or offices burn; the businesses that fail as result of burned stocks, destroyed records, or impaired credit; the irreplaceable lumber lost when forests burn; the hunger caused by destruction of badly needed grain and food stocks; or what is more important, the 10,000 lives annually lost due to burning buildings and burns.

Deaths Double in Decade

Records of the census bureau show that deaths in conflagrations and burning buildings have doubled in the past ten years, far out of proportion to the increase in population. In the past year, great fires have taken a terrible toll of lives. Virtually no class of structure has been without its devastating tragedy over a period of years.

Approximately three out of four fires, of known causes, fall in four main groups involving human carelessness, negligence, inattention or plain accidents. Experts believe that nine out of ten fires in these categories could be prevented by good housekeeping and cultivation of habits of caution and watchfulness. Habits of caution in the home would prevent thousands of useless fires and save thousands of the 10,000 lives that are lost annually through fire.

Of these fire deaths, four-fifths occur in private dwellings. Half of the more than 650,000 fires occurring annually in the U. S. start in these homes. More than a fifth of the fire fatalities are children under the age of 5 years.

Wheat on the ground. A familiar sight since the advent of bumper crops. This pile contains about 20,000 bushels of the harvested grain.

GWINN FIRE LOSS $300,000

Still under construction, the new plant of the Gwinn Milling Co., Columbus, Ohio, burned with a loss of $300,000. Fire cause was blamed on a hammer mill when a hammer came loose and wrecked the machine.

FIRE DESTROYS CROOKSTON ELEVATORS

A 12-hour fire that destroyed the two elevators of the Crookston (Minn.) Milling Co. left the mill without wheat storage capacity and caused a loss of more than $300,000. About 75,000 bu. of wheat and other grains were destroyed but the flour mill and a small feed plant were not damaged. Temporary facilities have been established.

OREGON MILL DESTROYED

The 3,400 sack mill of the Western Milling Co., Pendleton, Ore., was destroyed by fire with a loss estimated at $500,000. The mill, owned by Preston-Shaffer Milling Co., Walla Walla, Wash., lost approximately 65,000 bushels of grain in the 350,000 bushel elevator as well. The fire was caused by an explosion.

COKATO ELEVATOR BUILDING BURNS

The Cokato (Minn.) Mill & Elevator Co. suffered a $175,000 loss when fire leveled the plant. A bolt of lightning during an electrical storm was believed to have started the blaze.

OVERHEATED BEARING SETS BLAZE

Timely discovery of a blaze started by an overheated bearing that burned a small hole in the roof before it was extinguished, recently saved a Wisconsin grain elevator.

WAITED TOO LONG

A recent issue of the Millers' National Federation's *"Hook-Up"* stresses the importance of alertness in the prevention of fires. Random data on fires and their sources included the following:

"The storage adjacent to a mill had been giving trouble. The belts were thin and the boots badly worn. Material was on hand to make the necessary repairs but same were deferred until a later date when all orders were filled. Recently the plant burned."

Among the causes of fires listed were: worn out equipment, bad labor conditions, excessive dust, unapproved equipment, bad electrical installations, smoking, and operating beyond capacity without shutdown for repairs.

U. S. GRAIN PURCHASES TOPS

Export shipments of grain and cereal products accounted principally for the bulk of all purchases of agricultural commodities by the government. The cost of the grains bought from July 1946 through last June totaled $803,812,672. Wheat purchases, all of which were for the export program, neared 195,000,000 bu. and were valued at more than 403 million dollars.

UNIONS FIGHT STATE ELEVATOR

The state-owned elevator at Oswego, N. Y., is under fire from the grain labor unions in Buffalo who hope to force it out of competition with the privately-owned elevators. The move by the unions was started when three of the Buffalo elevators were forced to shut down for lack of receipts. The state elevator rates are considerably lower and consequently millions of bushels of grain are diverted from Buffalo to Oswego.

$36,570 FOR IDEAS SUGGESTED

In the first year of its operation, the General Mills Employees' Suggestion System paid out $36,570 in awards for adopted ideas. Among the ideas submitted were: Improved methods for unloading cars of grain; better procedures for sampling grain cars; improvements in existing grain forms and records, and sound safety suggestions relating to grain operations.

CANADIAN ELEVATOR EMPLOYES GET WAGE INCREASE

Nearly 1,000 employees of 16 terminal elevator companies at Fort William and Port Arthur were granted a 12½ cents an hour raise recently. Ten cents of the increase is retroactive to Jan. 1 and the balance to July 1.

SEES NEED FOR STORAGE RESEARCH

Research that will reduce or eliminate the loss of grain in storage should be given early attention under the Research and Marketing Act of 1946, according to the Grain Advisory Committee recommendations to the USDA.

The development of better varieties of malting barley, determination of the quality characteristics of soft white wheat grown in the Pacific Northwest, and a study of multiple points for the delivery of grain under future contracts are other important items especially in need of research, the committee believes.

With respect to grain storage, the committee's report points out that scientific methods for producing and harvesting grain crops have moved along much faster than knowledge and practices in the safe storage of grain. To correct this condition these specific suggestions are made: (1) Design suitable structures both for farm storage and for country elevators; (2) improve or develop facilities for drying and conditioning grain and for the control of insect infestation and rodent damage; and (3) make economic studies to determine the costs and the returns or profits the producer might expect from the installation of such facilities.

WESTLING DIES

Andrew Westling, 86, passed away July 29 in Minneapolis. Up to the time of his retirement he had been superintendent of Van Dusen-Harrington Co.'s concrete elevator.

ALL-TIME HIGH LOADINGS

Grain and grain products movement has been outstanding, according to the reports issued by the Association of American Railroads, and the present outlook indicates a continuance of record-breaking loadings. There has been an unprecedented degree of co-operation by the grain trade in keeping plants open on Saturdays and Sundays for the inspection and handling of grain.

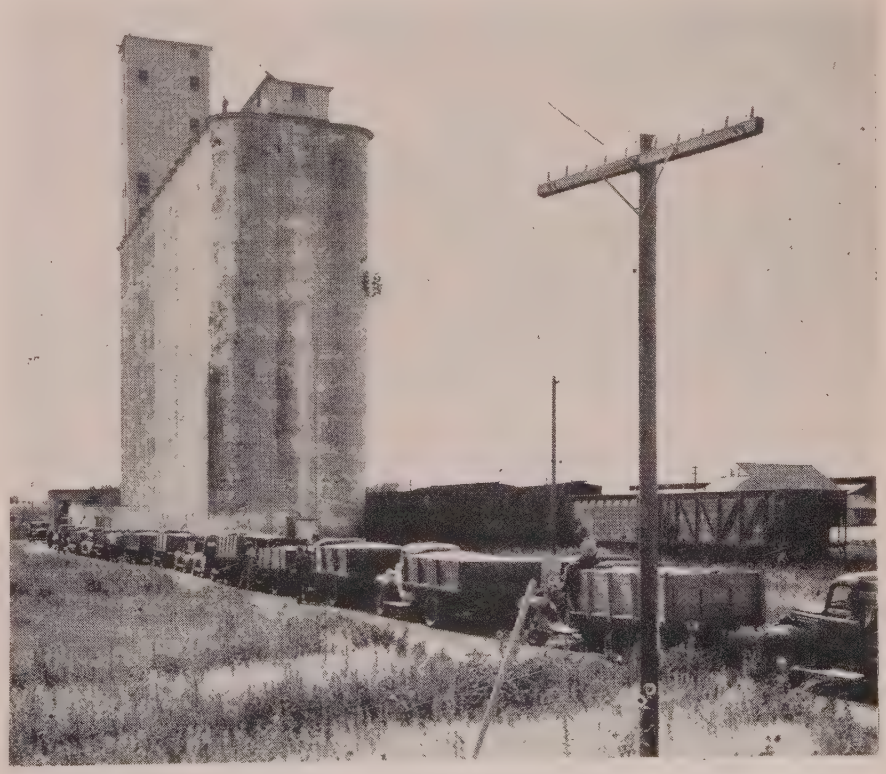
Carloadings for the month of July were:

	1947	1946	1945
July 5	58,967	46,472	54,932
July 12	71,093	59,027	65,645
July 19	71,933	63,526	68,553
July 26	72,927	59,121	67,849
30 weeks (+000) ...	1,561	1,396	1,500

The high increase in the 1947 carloadings tops the 1946 loading by almost 12 per cent and is 4 per cent higher than those of 1945. For the same period in 1944, loadings were 1,466,190 and for 1943 the number of carloads was 1,465,786. Loading of grains by roads serving Kansas, Oklahoma and Texas during July were reported as being about 48 percent greater than for the same period in 1946.

RECORD FLOUR PRODUCTION

According to preliminary compilations by the Department of Commerce, flour production of 300,191,000 cwts. for the year ending June 30 was the largest in history, passing the previous high of 1945-46 by 14 per cent.



Busy elevators. Long lines of trucks waiting to unload their cargoes of grain in the midst of the wheat rush.

JAILED FOR FAULTY CARS

Large quantities of grain are being lost along the Russian railroads rights-of-way because of improperly coopered grain cars with holes in the sides and floors, according to a report from IZVESTIA, soviet newspaper. Some old cars are being patched with clay and straw to keep them in service. Because of inadequate rolling stock thousands of tons of wheat are piled in the open waiting transport at loading points in the Ukraine.

The military tribunal of the Russian southern railroads sentenced a repair shop foreman to four years' imprisonment, and an inspector to five years, for sending faulty cars to grain loading docks.

MILLION MORE FOR AMARILLO

A 1,000,000-bu. elevator has been approved by CPA for the Panhandle Burrus Elevators for Amarillo, Tex. Cost is placed at $750,000.

RALSTON AT ST. JOHNSBURY

A complete new modern feed manufacturing plant is to be erected at St. Johnsbury, Vt., by Ralston-Purina Co. just as quickly as the necessary materials become available.

SHORT BUYS INDIANA PLANT

The Mt. Vernon (Ind.) Milling Co. was just acquired by the J. R. Short Milling Co. of Chicago. In addition to the 6,500 bu. white corn capacity per day, a number of country elevators were included. The Chicago firm is now completing a concrete storage addition. Manager Nelson E. Kelley continues with the new firm.

COX BUYS SHEETS, CONKEY

Bringing together two of the country's oldest feed manufacturing companies, Arthur F. Hopkins, head of the Charles M. Cox Co., Boston, announces the purchase of the business and assets of the G. E. Conkey Co. and the Sheets Elevator Co., including plants in Cleveland and Toledo, O., and Nebraska City, Neb., by a new firm to be known as the Sheets Elevator Corp.

Harold J. Garey, formerly production manager of four Cox plant affiliates, becomes vice president in charge of operations with headquarters in Cleveland. Frank S. Sheets remains as president of the G. E. Conkey Co. No other changes in personnel are contemplated.

Future plans include additional livestock, poultry and pet food production capacity to meet the demands of dealers from the Colorado to New England.

NEW PORT TERMINAL

Plans for the construction of a 500,000 bu grain terminal, which will give San Francisco its first bulk grain storage facility of major proportions, has been announced by the State Board of Harbor Commissioners. Edward E. Eyre of Islais Creek Grain Terminal Corp. will lease the property for 25 years at $18,000 per year rental.

FEDERAL GRAIN, LTD. NAMES OFFICIALS

Recently appointed grain elevator officials of Federal Grain, Ltd., Winnipeg, are: S. D. MacEachern, manager of the company's elevators in Saskatchewan and Manitoba; J. J. S. Rooney, assistant manager, and W. Pope named manager of the terminal elevators in Fort William and Port Arthur.

IOWA FEED SELLS PLANT

The Russell-Miller Milling Co. of Minneapolis has acquired the feed manufacturing plant of the Iowa Feed Co., Des Moines. The selling company will continue to make vitamin products in another plant.

NEW TACOMA PLANT FOR CENTENNIAL

At a special meeting of the board of directors, plans were authorized for the building of a new modern mill to replace the Centennial Milling Company's Tacoma plant destroyed by fire on Jan. 30. The new mill now being built will provide for production of 8000 sacks of flour per day, large-scale cereal manufacturing and dairy and poultry feeds. The rebuilt plant will include grain storage for 1 million bushels of grain.

The Effects of Moisture on Grain and Grain Products

By EDGAR S. MILLER,* Kansas City

Everyone is interested in the association between the kernels of grain and the moisture it attracts. Some phases of the relationship are readily understood while others can rightly be termed obscure. Those of us who are engaged in operating or supervising the operation of grain-handling or grain-processing equipment, or in designing such equipment or devising methods for using it advantageously, are also interested in the practical application of the sum total of all the known knowledge and the suppositions gleaned from the theories about the unknown.

It may be argued that the changes responsible for the heating and spoilage of grain are of a chemical rather than a physical nature, and that they are not actually concerned with mechanics—which is essentially identified with physics. But it is still a fact that chemical activity is brought about by physical means in which mechanics is involved and is measured by physical manifestations that operate in the field of mechanics.

A little fuller understanding of the laws operative in connection with the degradation of grains in storage, and with the phenomena concerned with preventive measures within the fields of physics and mechanics is useful, provided that men who are interested in "practical application", and capable of making use of the laws through which it might be achieved, are offered opportunity to "do something about it"—and are disposed to accept the opportunity.

UNQUESTIONABLY, everyone whose work and interests are concerned with any phase of grain handling, from the harvest field to the final disposition of the products of processing, is aware that the moisture associated with the constituents of the berries has considerable significance. Some phases of this significance are readily understood. Some may rightly be considered more-or-less obscure. And some that are well within the mental scope of effectual men whose knowledge of pertinent physical laws is considerably more than instinctive still present problems which, for one reason or another, seem to be insolvable within the limits of practical application.

Men like you and me must be interested in practical application; for whether we are engaged in operating or supervising the operation of grain-handling or grain-processing equipment, or in designing such equipment or devising methods for using it advantageously, we are mechanics. As such, we must have some understanding of the laws involved in the science of mechanics, and we cannot lose sight of the fact that the word "practical" actually has a more extended meaning than as the opposite of "theoretical." It doesn't signify merely that a machine or method of procedure will "work;" it should be taken to mean that either or both can be made to work usefully and profitably.

Economics—Mechanics—Physics—Chemistry

ALTHOUGH there are many things apparently tending to disprove the premise, economy is essential to the very survival of the human race. Only in times of emergency is wastefulness condoned, and then it is on the grounds that the time saved justifies it by imparting the element of overall economy. It is, of course, beyond the scope of a mechanic to judge whether or not this justification is always justified, but it must be plain that without some exterior element in the consideration, heavy losses of grain due to spoilage directly traceable to heating caused by high moisture content cannot readily be reconciled with the practical application of certain well-established laws concerned with the physical sciences and well known to many who do not presume to call themselves scientists.

It may be argued that the changes responsible for the heating and spoilage of grain are of a chemical rather than physical nature, and that they therefore are not actually concerned with mechanics, which is essentially identified with physics. But if it is possible to support the position that chemistry is a science distinct from physics, it is still a fact that chemical activity is brought about by physical means in which mechanics is involved and is measured by physical manifestations that operate in the field of mechanics. It is mechanics that harvests grains and moves them from the places where they were grown to their first stopping place in the process of utilization. Mechanics plays a major role in protecting them from the elements through which nature, their creator, would defeat man's purposing, and mechanics is always a factor in the processes through which the value of grains to mankind is enhanced, even when such processing is effected largely through chemical action and reaction.

The theory that nature created the grains for the benefit of mankind, or any other form of animate life, isn't widely accepted nowadays. Unquestionably the main purpose was, and is, the perpetuation of kind. The facts seem to be that such animals as were competent to utilize the grasses and the seeds thereof as nutriment did so instinctively in prehistoric times. Man, exercising a measure of intelligence, saw the benefit to himself of inducing nature to produce more and more of the berries of the grains with a greater and greater proportion of stored nutrient in each berry, and this same intelligence impelled him to garner and take extraordinary measures in trying to protect the grains for his own use, either indirectly, through the offices of the lower animals, or more directly through some sort of processing which enhanced palatability and digestibility.

Dormancy

BY THE nature of things, the seeds of plants are supposed to "dry out" and to go into a near-dormant state at maturity. The nutrients (intended for the use of the seeds proper, and not for lordly man or any of his animal slaves) assumes a like condition in the same situation. But because a dormant berry of grain is actually of little value to anybody or anything as long as it remains dormant, dormancy must be brought to an end before there can be utiliza-

tion of the nutrients, even by the embryos. Nature has taken care of this by having made the berries pervious to moisture, so that they can absorb water from the earth in which they are expected to take root and grow.

Now nature seems not to have endowed the organisms designed to convey and support inanimate life with intelligence. Or, if they are so endowed, perhaps they just don't give a hoot. In any event, berries of wheat or rye or corn, or beans and other things of similar structure and characteristics, are not affected solely by water absorbed from a seed bed. Their life activities are stimulated by moisture, whatever the source of it, if conditions of temperature are favorable. And since man (with unquestioned self-justification) injected his intelligence into the picture to serve his own ends, through the process of appropriating for his own use the food materials provided solely for the support of the growing embryos until such time as they could draw sufficient sustenance from the earth and the air and the rays of the sun, it should not be too much to expect him to make full use of his intelligence and ingenuity in an effort to avoid the loss of whatever he had gained.

Modern Necessities

THIS constitutes a really big order today. Once it was not so big, or at least it didn't seem so big. Fifty years ago it was common to allow corn on the ear to stand in the field, either in shocks or on the standing stalks that bore it, until the grain was sufficiently dried out. Wheat was bound in bundles at the time of cutting, and was usually stacked in such a way that the berries were well enough protected from the weather to give fair insurance against undue wetting. At the same time, when the stacking was well done provision was made for "natural aeration" which permitted any excessive water contained at the time of harvesting to be dissipated.

Man moved rather slowly in those days. He doesn't any more. Speed is essential in a civilization that demands so many things either unknown or obtainable by only a favored few a half-century ago that the activities of considerably more than half the population of civilized countries are required to provide them. The men and women so engaged produce almost no food, for themselves or anybody else. They must be supplied. And slow primitive methods can't possibly do the job. The industries which put speed into the "service of supply" have become gigantic individually and collectively, and the necessity for the practical application of mechanics, intelligently directed and co-ordinated with overall management, becomes greater year by year.

In the late decades of the 18th century a great deal of concern was being exhibited by learned economists and philosophers with regard to feeding people, and it was predicted that by the year 1930 the population of the world would "catch up with" the ability to produce food. No doubt the figures upon which the prediction was based were reasonably accurate. Nevertheless, it is supposed that there are more human beings living in 1947 than there were in 1930, and there doesn't appear to be much evidence that, on the whole, individuals now obtain less nutriment than was available in 1830.

Conservation

IT IS beyond the scope of a layman to discuss whether or not there has been an increase or decrease in the amount of productive land available, or whether the productivity of a given unit of such land is greater or less now than it was in the past. It can be accepted without argument, however, that there never was a time when it was more necessary to conserve such nutrients as are produced and get them speedily to the mouths of people who need them.

One thing the economists of the 18th and 19th centuries couldn't foresee is the part mechanics was to play in accomplishing this. That mechanics has been instrumental in increasing the world's area of productive land, as well as its productivity, is certainly true. It is, however, strongly probable that increased production unaccompanied by facilities for handling, storing and processing would make the overall situation worse instead of better. Food that cannot be utilized, either directly or indirectly as food by human beings, is not of much value to the world, which is "the world" only because of the human beings who inhabit it.

All in all, moisture is surely the most potent enemy of food conservation. This is particularly true of the cereal grains which largely sustain human beings as well as the animals that "process" crude vegetable substances into a wide variety of highly-valuable nutrients used by mankind almost to the limits of their availability. As has already been suggested, nature had to make the grains susceptible to moisture in order to make them capable of reproduction, but they were not constructed in such a way that they would reject moisture, to preserve a state of dormancy, at the will of man. It is in fact questionable that absolute dormancy is ever attained, for biochemists assert that the seeds of stored grains respire from the time they reach a state of maturity until death overtakes them. Under favorable storage conditions they may remain alive and virile for many years, and as long as they are alive they breathe, taking in oxygen and expelling carbon dioxide.

Combustion

THE "BREATHING" process denotes combustion, and combustion results in the generation of heat. And whenever heat is generated in a mass of grain the constituents of the grain provide the "fuel." Thus the evolution of heat evidences the destruction of nutrients. Though the amount of material destroyed directly may be small, even "slow combustion" is accompanied by an increase of temperature. And warm moist grain and grain products provide a satisfying environment for insect pests that are both destructive and contaminating. True enough, insects are not spontaneously brought into being in masses of sterile grain. But positive sterility with regard to insect life is attained, if at all in practice, only through extraordinary effort and circumstances that may be called "fortunate." Always, a high degree of danger accompanies the provision of an environment favorable to propagation.

It is a rather natural thing, when economies are being sought, for purposes to be defeated by succumbing to the lure of "shortcuts." Not always does the operator know the actual moisture content of all the grains in all the bins partially or fully filled, and facilities for "doing something about it," when there is evidence that it is too high for safety, are not always available. It would not be appropriate to try to suggest means for remedying unfavorable conditions when they are known to exist. Certainly this is not a time or place for platitudes and preachments, and there has already been at least enough of them in connection with virtually every activity of man.

It may be that a little fuller understanding of the laws operative in connection with the degradation of grains in storage, and with the phenomena concerned with preventive measures within the fields of physics and mechanics, would be useful, provided that men who are interested in "practical application," and capable of making use of the laws through which it might be achieved, are offered opportunity to "do something about it" and are disposed to accept the opportunity.

It would be distinctly inappropriate and much more than useless merely to suggest that a fuller and more intelligent use be made of the facilities already provided. When failure to do so is responsible for troubles and worries and losses, the facts are usually quite well known. And it is altogether probable that any individual who is fairly well acquainted with operatives and their problems would be quite willing to place a modest bet that such situations are not always of their making.

---

*A paper presented at the Annual Convention of the Society of Grain Elevator Superintendents. Mr. Miller is Technical Editor of the *American Miller & Processor*.

ADVERTISING PUTS MONEY IN YOUR POCKET

ARE you willing to spend 45 cents to save $15? Of course you are —if you know the facts. Sometimes advertising performs a miracle like that.

Ten years ago, a certain camera sold for $30. It was advertised extensively, sales increased, and overhead costs were reduced. Now, with larger production, the manufacturer is able to operate more economically and to sell a better camera for $15. The advertising cost amounts to 45 cents for each camera. The saving to the customer is $15.

In a similar way, advertising has helped to lower prices in many other specific cases. Yet there seems to be a common impression that advertising represents an extra cost, something that must be added to the price of what you buy.

Everybody knows that advertising costs money and that it is used to help sell goods. Less known is the fact that good advertising sells goods so well that it is the cheapest way of selling them. This is one of the reasons why it is possible to sell well-advertised goods at a lower price than if they were not advertised.

THEN there is the other important reason. As advertising builds the sales volume of a company faster and greater than any other method, it makes large-scale manufacturing possible, and that reduces the cost of making each article. When there is competition, which there usually is, manufacturers and dealers lower their prices as rapidly as they can. In this way, consumers get the benefit of the savings that advertising effects in the costs of selling and manufacturing.

When you see thousands of dollars spent for a single advertisement or a single radio broadcast, it is only natural to assume that you have to pay for it when you buy the advertised article. But few people realize how little this cost really is when spread over the large number of units sold through the advertisement and how large a saving this makes in the total cost. On canned food, the average cost of advertising is less than one-half cent per can. On one of the most widely advertised soft drinks the advertising cost is less than one-fiftieth of a cent per glass!

LUMPING together all the advertising in the country, the total expenditures amount to less than 2 per cent of the value of all goods sold. This is very small in comparison with other selling and distributing costs. The Department of Commerce estimates that in 1935 the total cost of distribution was 28 per cent. So it appears that the total amount spent for advertising is only one-fourteenth of the whole cost of distribution.

If no money were spent for advertising, the cost of selling and distributing would be far higher than it is now, and prices would have to be higher. More important still, a smaller volume of goods would be sold and produced, and there would be less employment, and a smaller share of the world's goods for each of us. Advertising puts money in your pocket.

NEW PLANT FOR DR. HEINZ CO.

The purchase of new feed plant facilities to replace those in St. Bernard, Ohio, lost last January in a $300,000 fire, has been announced by Dr. W. C. Heinz, owner of the Dr. Heinz Company.

The Heinz concern recently acquired the plant of the Bloomingburg Grain Company at Bloomingburg, Ohio, near Washington Court House. The property has large grain storage facilities and grain drying equipment. Automatic feed manufacturing and handling machinery is now being installed and full scale production will begin within 60 days. Additional warehouses are now being built.

EXPANDING STORAGE CAPACITY

The Knappen Milling Co., Augusta, Mich., will boost its storage capacity to one million bu. as a result of an expansion program now in progress. Loading and unloading of grain will be likewise increased. The firm has carried on its new building program since 1938 and increases in capacity were made also in 1941 and 1942.

N. D. ELEVATOR ADDS STORAGE

Preliminary construction has started on the new additional storage structures at the North Dakota Mill & Elevator, Grand Forks, to add capacity of 900,000 bu.

WILL ENLARGE OPERATIONS

Sioux Industries, Inc., will enlarge the operations of the Western Soybean Mills of Sioux Falls, S. D., which it acquired for above $600,000. According to general manager E. A. Woodward, the new company is incorporated at $1,000,000.

SUB-TERMINAL FOR PITTSBURGH

R. F. Cunningham Co. will build a sub-terminal near Corliss tunnel in Pittsburgh, Pa., for storing, washing and drying grain before diversion to its feed and flour plant at Washington, Pa. Replacing a smaller structure destroyed by fire last year, the reinforced concrete plant will be operated under the name of the Pittsburgh Grain Elevator Co.

BUYS CAR DUMPER

A car dumper, a new truck dump, and other modern equipment went into Central Soya Co.'s new 1,000,000 bu elevator addition, bean preparation plant, solvent extraction building and new workhouse to serve the old and new storage facilities at Gibson City, Ill.

JEST FOR FUN

Her hat was on the side, her clothes rumpled and her shoes in shreds.
"Were you knocked down by a motorist?" asked a sympathetic bystander.
"No, picked up," she snapped.

* * *

"Were you disappointed in love, old man?"
"Yes, twice. The first jilted me, and the second didn't."

* * *

A little girl, sitting in church, watching a wedding, suddenly exclaimed:
"Mummie, has the lady changed her mind?"
"What do you mean?" the mother asked.
"She went up the aisle with one man and came back with another."

A little whisk broom asked his mother: "How did I get here?"
Answered his mother: "Your daddy and I swept together."

* * *

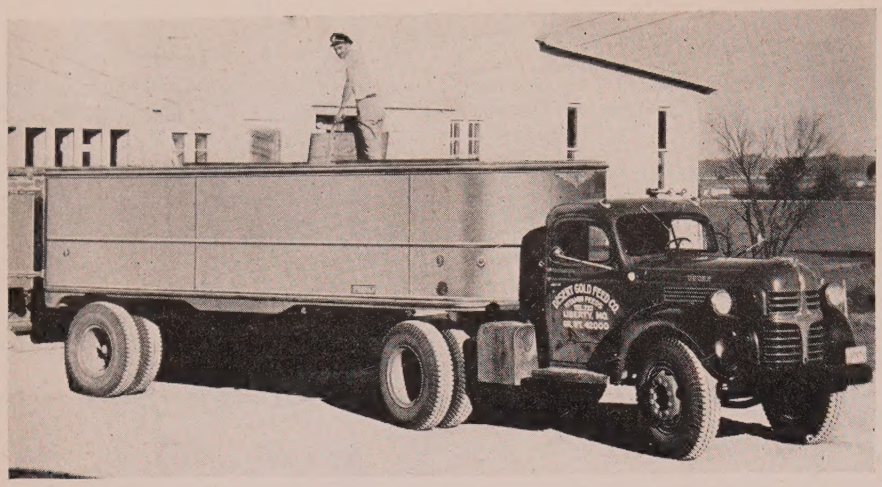
A recent newspaper ad of an Oklahoma school paper read: "Short course in accounting for women." Not long after the ad appeared, a note reached the school's president. It read: "There is NO accounting for women."

* * *

"I'm a self-made man."
"You're lucky. I'm the revised work of a wife and three daughters."

* * *

It has been said—he who has a good neighbor has a good morning.



NEW GRAIN HAUL TRAILER

Fruehauf Trailer Company, world's largest manufacturer of trailers, announces the addition of a new grain haul trailer to its line of commercial truck-trailers.

The new model uses the basic Fruehauf integral-frame, tubular-strut construction, with extra reinforcements, such as top rub-rail and spreader bars, to insure maximum strength.

It is available in lengths from 20-ft to 34-ft., with either single axle under-construction or with Fruehauf's new gravity suspension tandem in which leaf springs are eliminated.

PRODUCTION STARTED IN NEW SCREW CONVEYOR CORP. PLANT NO. 2

To augment production of their Hoffman Street shops in Hammond, Ind., Screw Conveyor Corporation has commenced operations at its new Detroit Street plant, despite a delay of more than six months in the completion of the building.

The plant will be devoted exclusively to the assembly of Screw-Lifts, Screw-Veyors, and Screw-Flo—the latter being a revolutionary improvement in Screw-conveying. When final machinery and equipment is installed, Screw-Lift production will range from 60 to 90 Units a month, together with a vast flow of Screw-Veyor assemblies. Screw Conveyor Corporation are manufacturers of the well-known "Nu-Hy" Grain Buckets and "Nu-Type" Vented Flour Mill Buckets.

COMPANY NAME CHANGED

Name of The Mining Safety Device Company of Bowerston, Ohio, has been changed to The Nolan Company, consistent with the company's major brand name of "Nolan" and its long-range integration program, G. W. Merritt, general manager of sales, announces.

"WALL BREATHING"

Maintenance engineers, architects, and building owners will find valuable new information on the principle of waterproofing and weatherproofing in "Wall Breathing", an interesting new 20-page booklet. Disruption of masonry surfaces, problems of building owners and waterproofing methods are described in detail. "Wall Breathing" may be obtained from Western Waterproofing Company of Missouri, Syndicate Trust Building, St. Louis 1, Mo.

SPRAY NOZZLE AS FIRE STOP

Spray nozzles offer promising possibilities in meeting the problem of preventing the spread of fire through conveyor openings. The development of water-spray as a fire-stop, initiated by the Factory Mutual Laboratories, takes on increasing importance as modern methods call for more and more use of conveyors.

LIKED SAFETY FILM

The SOGES Safety film entitled "Dangerous Dusts" was shown to our entire personnel with excellent effect, I believe. It is my intention to avail ourselves of some of the many safety films in Steve Halac's (The Glidden Co., Chicago) library and to show them on a well organized program. I plan to install sound motion picture equipment in our cafeteria and to show these films at weekly safety meetings.—Charles J. Winters, Supt., Public Grain Elevator, New Orleans.

Weevil-Cide SPLITTERS

DISCREPANCY

He: "Go ahead. Tell me about myself."

Fortune teller: "You're a married man."

He: "Right."

Fortune teller: "You're the father of three children."

He: "That's where you're wrong. I'm the father of four children."

Fortune teller: "Continue thinking so, my friend. But the cards have never lied."

* * *

SINGLE BLISS

Wife (at climax of a domestic argument): "All men are fools!"

Husband: "No, my dear. Some are bachelors."

* * *

EXTRA MILEAGE

Post Office clerk: "You've put too much postage on this letter."

Lady: "Heavens! I hope it won't go too far."

* * *

LOYAL DEFENDER

Husband: "I met Upton on the street today and he refused to recognize me. Thinks I'm not his equal, I guess."

Wife: "You certainly are his equal! He's a windy, conceited stuffed shirt!"

* * *

DOCTOR'S ORDERS

Old lady: "Little boy, why aren't you in school instead of going to this movie?"

Little boy: "Hell, Lady, I got the measles and the Doc said I should be kept in a dark room."

HER PRIVILEGE

The girl came into the house after a ride with her boy friend. Her mother noticed that the girl's right shoe was covered with mud. Puzzled, the mother asked for an explanation.

"Oh," said the daughter, "I just changed my mind."

* * *

DEFECTIVE

Young wife: "I'd like half a dozen cigars, please—for my husband."

Clerk: "Fairly strong?"

Young wife: "Yes, please. The ashes kept breaking off the last ones I bought and getting all over the rug."

* * *

A-HUGGIN' AND A-CHALKIN'

Professor: "If you start at a given point on a given figure and go all the way around it, what will you get?"

Freshman: "Slapped, sir."

* * *

HE NO SAVVY

A GI stationed in Japan wrote his folks back in Iowa that he was planning to marry a Japanese girl.

His parents, considerably perturbed over an interracial union, nevertheless decided to exercise tolerance provided the girl could conform to a reasonable standard for her future life in Iowa. So they wrote their son that all would be well if the girl would become a Christian and a Republican.

By return air mail the son wrote back that the girl was already a Christian. He added, "And I'm pretty sure she must be a Republican because the first time I tried to kiss her she said, 'I know Dewey.'"

* * *

MISPLACED

A teacher had just separated two little boys who had been fighting at recess. "Jack," she asked, "Why did you kick Henry in the stomach?"

"I couldn't help it," said Jack. "He turned around too quick."

CORRECTION

Jimmy: "The Bible says all the animals came on the ark in pairs."

Timmy: "All except the worms. They came in apples."

* * *

A NEW BLEND

A young man, plenty drunk, had draped himself around a lamp post. A priest of his acquaintance walked up to him and said, "Terrence, what do you mean by getting yourself in this condition? What on earth have you been drinking?"

To which Terrence thickly replied: "Three Fathers, Feather."

* * *

FOOLED THEM BOTH

Landlady (in hall): "I thought I saw you taking a gentleman up to your apartment last night, Miss Kelly."

Miss Kelly: "Yes, that's what I thought too."

* * *

PATRIOTISM

Preacher (giving instructions to organist): "Now, just as I finish my sermon I'll ask those who want to contribute $5 toward the church mortgage to stand up. Meanwhile you play appropriate music."

Organist: "Appropriate? Such as what?"

Preacher: "Well, I think 'The Star Spangled Banner' would be nice."

* * *

TWO FRIENDS, NO DOUBT

Janice: "She sure gets the men with that line."

Millicent: "Yeah—the line of least resistance."

* * *

PALS

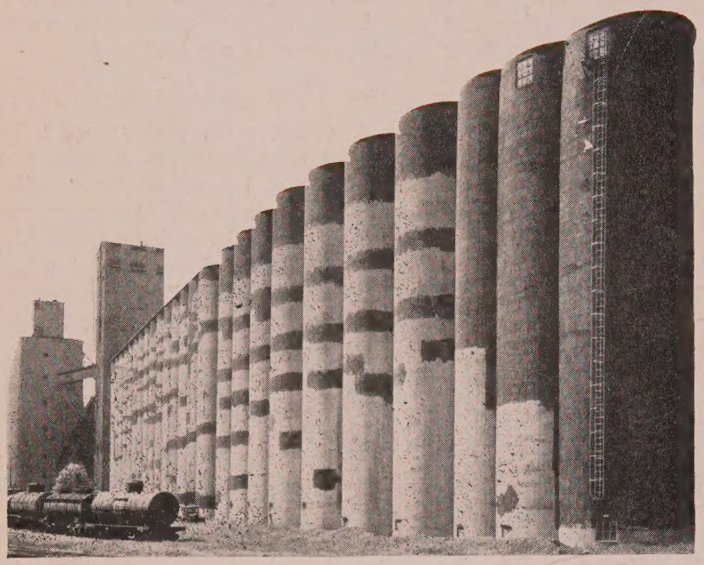
Two rival suitors met in the living room of the girl friend.

First suitor: "How are ya?—Not that I give a damn."

Second suitor: "Okay, thank you. Say, you're looking good. Who's your embalmer?"

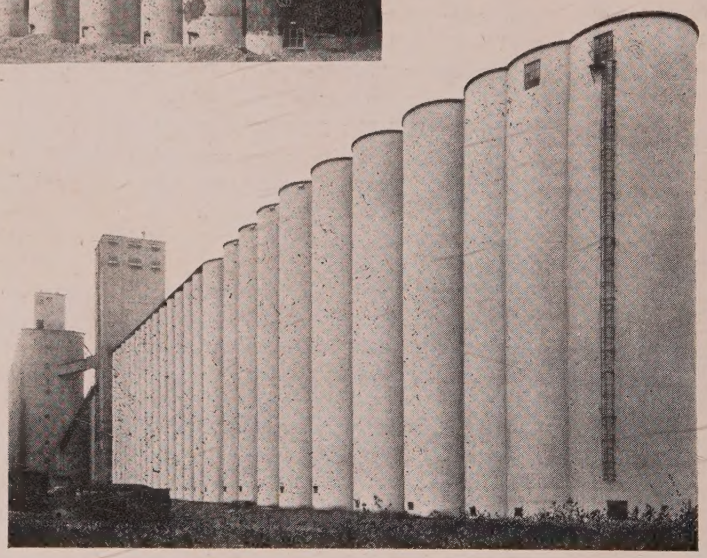
Protecting America's Grain...

by Repairing and Waterproofing GRAIN ELEVATOR CONSTRUCTION



BEFORE

Shows job before our treatment. Random repairs like those shown had no practical value. We began with basic repairs.



COMPLETED

Here you see the decorative and light reflecting finish. Under this is our pliable type of waterproofing.

Complete Contract Service . . . HORN tested materials . . . HORN skilled mechanics . . . HORN expert supervision . . . HORN guarantee. List of references upon request.

ESTABLISHED 1897
HORN
50th ANNIVERSARY

CONTRACTING DIVISION

A. C. HORN CORPORATION

10-29 44th ROAD, LONG ISLAND CITY 1, NEW YORK
803 PENCE BUILDING, MINNEAPOLIS 3, MINNESOTA
1836 EUCLID AVENUE, CLEVELAND 15, OHIO

SUBSIDIARY OF
Sun
CHEMICAL CORPORATION